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Diagnosing Fertility Needs . . . Of Orchards

BY J. H. WEINBERGER
ASSISTANT POMOLOGIST U. S. HORTICULTURAL FIELD STATION, BETSVILLE, MD., IN "BETTER CROPS WITH PLANT FOODS"

Nitrogen, phosphorus, and potassium are the elements usually thought of as fertilizers for orchard trees. These are elements that are most often lacking for plant growth in soils in this country. However, there are eight other mineral elements that have thus far been found necessary for the successful growth of a fruit tree. If the soil lacks any one of these, the trees cannot survive and definite disorders or symptoms are produced in the tree by which it is often possible to diagnose the cause of the trouble. A fertile soil must necessarily contain an adequate available supply of all essential elements, and most orchard soils in Maryland are deficient only in nitrogen.

Deficiency Symptoms

In many sections the disorders caused by lack of one or more of these elements are of considerable economic importance. For example a yellow mottling of the leaves and a rosette of peach, citrus and other fruit trees in California are cured by applying zinc sulfate to the soil. A similar disorder affects apple trees in Washington and pecan trees in the South. In South Africa ¼ to 2 pounds of copper sulfate per tree is applied to the soil to overcome chlorosis (loss of green coloring matter or chlorophyll) and rosetting of peach trees. In Florida, die-back of citrus trees is controlled by application of copper salts. Die-back and chlorosis of prune trees in California are associated with deficiencies of potassium in the soil. Leaf scorch of apples in Massachussetts is also associated with potassium deficiencies. In parts of California and Florida manganese is regularly applied to citrus trees to overcome chlorosis. In any part of the country trees on a high-calcium soil may suffer from a lack of available iron. Internal cork and certain types of drouth spot apples are physiological disorders which are associated with nutrition.

It is possible to produce these symptoms of mineral deficiency under controlled conditions. In order to be able to identify them when they occur in the field, 1-year-old peach trees were grown in sand supplied with a series of nutrient solution in each of which, one particular element was lacking. In this way definite disorders were produced whose cause could be identified Most of the observations reported here were made on peach trees grown under controlled laboratory conditions at Betsville, Md. Description of deficiency symptoms of apples are taken from the reports of Wallace on behavior of trees in the field and in sand cultures.

By far the most important element in the fertilizing of orchard trees is nitrogen. This element is easily leached out of the soil and under Maryland conditions trees respond most readily to applications of nitrogeonous fertilizers.

When the nitrogen supply in the soil is low the trees lack vigor, terminal growth is short, few leaves are formed, and few fruit buds are differentiated. Leaves are small, yellowish green, much twisted and curled, and develop reddish tints and reddish brown spots. Leaf and blossom buds are slower to open in the spring and defoliation takes place earlier in the fall. The flowers are weak, often do not set, and if they do set, the fruits are apt to drop. The fruits ripen earlier, are smaller, and usually highly colored. Nitrogen starvation is apt to appear in sod orchards or on shallow soils. It is the most easily controlled deficiency and seldom proves fatal to the tree.

Phosphorus and Potash

Phosphorus deficiency on fruit trees has seldom been reported under field conditions. When peach trees are grown in pure sand supplied with a nutrient solution lacking phosphorus, they stop growth

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* Reprinted from Proceedings of the Maryland State Horticultural Society.

IMPRESSIONS

..By..
Frank Kay Anderson

Future history note: "During the term of Postmaster General James Aloysius Farley most of the stamps used were sport models."

From dabbling a bit in verse Riley M. Fletcher Berry (Mrs. C. M. Berry to you) of Sanferd steps forward as a real poetess. The former author of the Florida Citrus Exchange recipe booklets, of which many hundreds of thousands got into circulation a number of years back, has one of her poetic outbursts embalmed in an Anthology of the Verse of 1937 recently issued by a prominent New York publishing house.

And Mrs. Elvira Garner's book, Ezekiel, for children is tops among the half dozen best sellers of the country. So the wife of another Sanford and Seminole County grower gathers literary garlands. Evidently there is mental stimulation in the classic atmosphere of Seminole county.

And Zora, which is Zora Hurston, cullud lady authoress, has just brought out another novel, which the press agents claim will eclipse her Gabriel's Gourd Vine of a couple of years ago. Zora was bawn 'n raised in Seminole County, her pappy having been a minister of the gospel in and about Sanford in years gone by. Though when Gabriel's Gourd Vine made its appearance Zora did a little backsliding over the county line into Orange county, for the nice Yankee white women in Maitland and Winter Park didn't hesitate to take up a famous cullud lady in a big way; and when Zora and a few of her chocolate male friends from Harlem began to be a bit conspicuous in shorts and bathing suits upon the streets of Longwood, that Seminole county community's expressions were not wholly approbation.

There is no doubt of the literary inspiration of the environment of Seminole county, in which these Impressions regularly are written.

But when our own wife takes to writing it is likely that this writer will have to leave. Some folks just know too much for their own good.

Something like old fashioned New Year's calls, the sudden gaddings about of citrus growers and packers on the morning after a cold snap has clamped down on the night before. Short, angels' visits, so to speak, of everybody upon most everybody else, to find out what really has happened, what the other fellow knows, and what he guesses.

On that snappy morning at the beginning of the second week in December we were abroad early, and did a lot of visiting about ourself. After dropping in at several packing plants we obtained a concrete impression of a coincidence that might have been funny if there had not been a serious side. It was the lines of growers forming on the left and awaiting each packer in order to give him first chance at a few thousand boxes of fruit which through some almost miraculous oversight of Jack Frost, in their respective groves, had been spared from damage entirely.

Never were the advantages of especially protected locations more manifest than in that particular cold snap. Variations of as much as five and six degrees between spots but a short distance apart were developed in numerous places by recording thermometers. By the by, we have become convinced that the recording thermometer affords the only cold data really worth while to citrus growers.

The wisdom of the policy of Chase & Co., developed through fifty years and more of citrus growing, of shucking off groves in cold locations and focusing their attention upon groves exceptionally protected by Nature, was pretty well demonstrated.

But everybody's grove is not in an exceptionally protected location, and for them the wisdom of the use of heaters was pretty well demonstrated too. For instance, in the famous Crosby & Wartmann holdings in Marion county. There were forty-seven hundred newly purchased 9-gallon oil heaters hard at work, in addition to another hundred earlier bought, as well as a certain number of coke heaters, and some wood fires to save the trees in spots where fruit already had been picked. The results obtained abundantly justified the purchase and operation of the heaters.

We were riding in the rear seat of a seven passenger automobile. The better to listen to the fellow driving, we moved up and sat on the big cake of ice that we were carrying in between the front and rear seats, right where the auxilliary seats should have been. After sitting thus for a bit we began to feel a cooling effect upon the base of our brain. We would have moved back to the rear seat, but some fellow had moved in where we were sitting and there was no room. We got colder and colder; and we noticed that the ice where we were sitting had become hollowed out like the seat of a Bank of England office chair. Finally we shivered so hard that the bed rattled and then we woke up. The clock said 4:30 a. m., so we put on our wife's bathrobe and our own bathrobe and a couple of horse blankets, and went out on the front porch to see what time it was by the thermometer. Life in a Florida cold snap.

Howard C. Babcock the Orlando grower, accompanied by Mrs. Babcock, was one of the fast-traveling earnest seekers-after-the-truth on that cold morning with whom our personal orbit coincided rather coincidentally.

Another was Herman F. Siewert the Winter Park grower whose hob-

by is making those beautiful colored moving pictures. You know what is meant. All of them are colored and most of them are beautiful, but, of course, if it is a picture of Jim Treat or John Hale it ain't beautiful.

At any rate our meeting with Herman Siewert was profitable, in that it obtained for us an invitation to sit in at an early private showing of some of his films.

From Bushnell, J. E. Pulleyn, who when he has time to waste uses it most wastefully in reading these Impressions, takes his pen in hand to chide us for our ignorance as exhibited in a recent reference to the wages now paid to the "sweepers" in Detroit automobile factories. He says the sweepers are skilled mechanics who must be able on occasion to step right over and take the places of workers on the assembly line should the latter be hurt, or, we gather, hold up their hands and want to go out. And we thought that sweepers swept.

With the Florida grapefruit crop for this season down more than one-third below last season's figures, and the Texas grapefruit crop off about ten per cent, no one in Texas or Florida will worry over Arizona's estimated increase of slightly more than a million boxes of grapefruit. Yet it is a good thing to file those figures for future reference, at some time when other things to worry about run low.

From a grand high in the season of 1934-35, when 19 per cent of Florida's citrus moved out of the state by truck, there was a very considerable shrinkage to last season, when only 12 per cent went forward by truck. Though, while total truck shipments have thus diminished, and haphazard truck handlings by hit-or-miss, speculative truck operators have dropped down, it looks as if certain more carefully calculated truck operations are here to stay.

Norman De Forest, the well known Sanford citrus grower, last year operated the Gillies packing house north of Maitland on State Road No. 3 for truck business, first as an outlet for his own fruit and then for purchased crops. Again this season he is doing a land office business there. He, and others specializing in fruit supplies for the truck trade, seem to be building more or less permanent clienteles and among truck operators who in turn have developed established outlets; and who are able on starting their southbound runs to telegraph ahead their loading requirements and approximate time of their arrivals. Shrinkage of truck trade, is we think, felt more by the established, commercial packers.

At one specialized fruit-for-trucks house recently the loadings for a single day included loads for such diverse destinations as St. Joseph, Missouri; Lansing, Michigan; Washington, D. C., and Danbury, Connecticut.

This stirabout in China a long way away. Pretty remote, it seems, to most of us. But not to J. S. Crutchfield, president of American Fruit Growers Inc. His daughter Harriet holds a very responsible position with the American embassy in China, while another married daughter has, with her husband and child, been living in China. The latter, with her husband, was home on furlough when the undeclared war broke out, and has remained in safety. Miss Harriet was in Nanking during the earlier aerial bombardment of that city, then with most of the embassy personnel was gotten away to relative safety of Hankow, though two embassy men remained to be caught on the ill fated Panay when that vessel was sunk.

Mention of furrin parts reminds of a recent meeting with Bill Sims, son of Wythe Sims the well known grower of the Lake Conway section south of Orlando. Bill is general European manager of Colgate-Palmolive-Peat Co., and lives in Paris. He just dropped in on his father and mother for Christmas, while on a brief jaunt to this side of the water. Covering the whole of Europe regularly in his travels, as well as getting out into the Balkans and over into Turkey, he is just about the one best posted individual we have met concerning Europe as it is today.

Most interesting sidelight we got out of our recent conversation with Bill Sims was his statement that today the Scandinavian countries are enjoying a booming and substantial prosperity. Couple that with the fact that those same Scandinavian countries stuck to more or less old fashioned common sense lines and employed few, if any, emergency or relief measures in their effort to combat the general depression, and apparently there is something for the economists to think about.

Maybe we ought not to give expression to the thought, but it does seem funny that Bill Sims, living as he does in Paris, doesn't understand better this writer's French.

A young lady, who wishes to remain anonymous, sends word that last month's output of Impressions contained two — count 'em two — grammatical errors. Lady, you are wasting your time. Looking for gramatical errors herein is just about zero in occupations. As well look for rocks on Stone Mountain.

Apropos the trouble in Palestine, the magazine Life recently published some interesting pictures from there. Particularly interesting to us was a big picture of the roadstead at Jaffa with a ship lying offshore and being unloaded and loaded by lighters. We had been told years ago by one of the Jewish dignitaries of the Palestine colony that the hazards of the roadstead at Jaffa — it really cannot be called a port — are the big handicap of the Palestine citrus industry. The picture showed it very clearly. In this instance the sea was quiet as a mill pond, but the distance at which a big boat must lie offshore, due to the shallow water, and the manner in which cargo is piled, unprotected, upon the beach, showed plentiful hazards.

Couple this with generally uncertain weather, so that many times boxes are smashed either in loading the lighters or in transfer to ship and frequently ships being compelled to put out to sea to await the subsidence of a sudden blow, or to depart in haste leaving part cargo to lie on the beach awaiting the next boat, maybe a week later, and it is no wonder that ten per cent decay in the oranges arriving at London is a continuing problem for the growers.

Col. Joe Gentile and Charlie Sweeny, of Sweeny-Lynes Co., of Boston, have so much on each other that neither is willing to trust the other out of his sight for long at

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Woolfolk Anticipates Satisfactory Prices On Mid-Season Oranges

NEW EVERY-DAY REDUCED RATES WILL HELP, SAYS TRAFFIC MANAGER GUTHRIE

Florida's citrus growers can expect a firm, satisfactory market on all of their early and mid-season fruit, R. B. Woolfolk, vice president of American Fruit Growers, declared before the opening of the present season in his fall review of crop conditions and marketing prospects. "While the government estimate increases the orange crop by around 1,500,000 boxes over last year, yet on account of general conditions, the time of maturity, and other favorable factors, I see no reason why growers should be stampeded, or lose confidence in the general outcome of the price levels on early and mid-season oranges," Mr. Woolfolk said.

"Conditions are so much different than last year and in our competitor state of California, on account of the setback caused by the feeze of last January, the maturity of fruit has been retarded. Shipments of Navel oranges from that state he predicted would not be in any volume until late in November. It is a fact he said that the old crop of California Valencia oranges is practically finished. This leaves a wide open market for Florida fruit throughout the United States, or at least in all of the markets east of the Rocky mountains. This situation can be expected to continue well into December.

"Our situation here in Florida is also altogether different from any year I can remember," the Blue Goose executive continued. "This citrus crop has been distributed by nature herself. The blooming period this year extended over six to seven months which will prevent the entire crop from maturing at one time. This will insure a regular movement of fruit to market.

"It is generally known that it requires nine months from the blooming time to the maturity of citrus fruits. Fruit must be this old to pass state and federal maturity tests," Mr. Woolfolk continued.

He declared that for these reasons, "we can expect a firm satisfactory market on all of our early and mid-season fruit."

Turning to Valencia oranges, Mr. Woolfolk recalled that "with only a few exceptions in the past Valencias have been a paying crop for the growers of this state."

Discussing grapefruit prospects, he said: "The estimated crop is very much shorter than last year.

The canners opened their plants about the middle of November. Since the stock of canned grapefruit in the hands of retailers is very limited, most of last year's pack having gone into consumption, we can expect satisfactory prices for these two grades, the markets will be strengthened for fresh fruit of the seeded type. The canning of 'hearts' requires the seeded varieties of grapefruit."

Referring to conditions in Taxas, Mr. Woolfolk asserted that "in Texas, our competitor for Marsh seedless grapefruit, on account of a severe drought it was reported fruit was running to small sizes. With the curtailed supply of Florida Marsh seedless grapefruit available, the demand already developed, and the export market for our seedless grapefruit strong — prices satisfactory to the growers could be expected."

The new every day reduced rail rates on citrus shipped from Florida to the northeastern port cities, as now authorized by the Interstate Commerce Commission, "will be of inestimable value to Florida's growers and shippers this season," Thos. D. Guthrie, traffic manager for the Growers & Shippers League of Florida, declared recently.

"We are in receipt of telegraphic advice from Washington that the I. C. C. has approved applications of the railroads to apply present truck-boat competitive rates on citrus fruit from Florida to U. S. North-Atlantic ports every day of the week, in lieu of the present 4-day per week sailing plan," Guthrie said in his statement.

"It is our understanding that the railroads contemplate putting the every-day-of-the-week plan into effect on short notice," he declared, adding: "We are further advised that the Commission still has under consideration applications of the railroads to furnish, without charge, certain types of refrigeration in connection with the truck-boat competitive rates and that a decision in respect thereto will be announced later."

DIAGNOSING FERTILITY NEEDS OF ORCHARDS

(Continued from page 5)

early in the season, but appear perfectly healthy. The leaves are large dark green in color, and have a tough leathery appearance. They lack the bright green color of leaves on a vigorously growing tree. In severe cases shoot growth is small, leaves are small, and defoliation occurs early. Wallace reports that on apples fruit size is reduced, as in nitrogen starvation, but the fruits are poor in quality and have a dull, bronze finish In certain soils in England, where the phosphorus supply is so small that pasture plants cannot grow healthily, fruit trees show no sign of phosphorus deficiency.

When available potash is scarce in the soil, the effects on the trees are less drastic than from nitrogen deficiency but are more serious because of the difficulty of control. Terminal growth may be just as great on potassium starved trees as on others, but the twig diameter is smaller and the leaves are spaced farther apart, giving the tree a spindly appearance. The distinguishing symptom of potassium deficiency is the "leaf scorch" which develops when the margins of the leaves die, and the dead tissue falls off in ribbons. In the center of the leaf small spots of dead tissue appear also. The leaves are light green in color, smaller in size, and seem thin, brittle, and papery. The edges of the leaves are curled inward. Sometimes a chlorosis appears in the leaves near the margins and between the veins.

With apple trees as reported by Wallace, defoliation occurs early, the leaves at the twig tips dropping off first. In severe cases the tips of the branches may die back. Blossom buds are formed and may set, but the fruits are small and of poor flavor. In mild cases, applications of

potassium fertilizer to the soil will correct the trouble, but in severe cases recovery more difficult, and often death of the tree results. In any potash fertilization it is important that the fertilizer be placed as close to the roots as possible, since this element is quickly combined in the soil and rendered unavailable.

A simple calcium or lime deficiency of fruit trees does not often occur in the field. Calcium-starved trees grown in sand cultures have large, deep green leaves which tend to be stiff and to roll the edges inward. Late in the season usually a large area of dead tissue, usually in the center of the leaf, becomes yellow and quickly dies. The injured leaf soon drops off. Shoot growth may or may not be normal. So far as has been observed with apple trees by Wallace, bark, blossoms, and fruit are normal.

Magnesium deficiency symptoms are quite similar to calcium deficiency symptoms, except they are more severe, and break down usually occurs in areas between large veins. Unless large amounts of iron are available, chlorosis is apt to occur also. Defoliation follows the appearance of break down in the leaves, the old leaves dropping off first. New foliage is continually being produced but it, too, is soon affected and drops off. Apple fruits are woody and fail to mature because of lack of foliage.

Where iron is lacking or is unavailable in the soil, severe chlorosis results. The veins, as well as the areas between the veins, lose their green color, and may even become almost white before they drop off. The leaves at the tip are lost first, as contrasted to the older leaves lost first on no magnesium treatment. Lack of iron under field conditions may occur where considerable calcium carbonate or limestone is found in the soils or in the rock from which the soil is derived. Although the soil may be high in iron content, the iron may be rendered unavailable to the trees by the action of the excess lime. Iron chlorosis on peach trees also occurs readily in sandcultures when potassium, calcium, or manganese are lacking and iron supply is low. Under these conditions, if the trees are given either iron or one of the other elements, the trouble may disappear.

No disorder of fruit trees due to a lack of sulfur has been reported, and where trees are sprayed with sulfur for the control of diseases, there is likely to be none. However, sulfur is an essential element, and fruit trees growing in its absence soon stop growth. With peach trees the terminals die and new shoots start out below the tip, which are small and produce only small, light green leaves These later assume red or orange tints. The older leaves turn light green, resembling low-nitrogen leaves, and later large areas of the leaves at the tips or margins die, shrink, and distort the leaves. Defoliation does not occur until late in the season.

Most soils contain ample supplies of manganese, and the cause of manganese deficiency disorders usually lies with certain soil conditions, which render manganese unavailable to plants. High-lime content is a common cause, as with iron deficiency. With peach trees, lack of manganese produces a dull, yellowish green color on the leaves. Chlorophyll is lost from the areas between the veins, but not from the veins and the areas adjacent to the veins. Growth is stunted, and the leaves drop prematurely.

Internal cork and certain types of drought spot in apples are rather widespread in occurrence and appear to be associated with boron deficiency. Various workers in New Zealand, British Columbia, New York, and the U. S. Department of Agriculture have reported success in the control of internal cork and drought spot in apples by the use of one-third to one-half ounce of boric acid placed in holes in the trunk of large apple trees, or by application of one pound of boric acid per tree on the soil. With peach trees in boron-deficient sand cultures, the terminals die back, and lateral buds commence growth, but soon become affected. Small irregularly-shaped areas in the leaf die and drop out. On the stem end dark brown corky spots appear, giving a rough appearance.

Applications of zinc to fruit trees have been successful in cambating a disorder called rosette or little leaf. The leaves are small, chlorotic, and and branch growth is stunted, giving a rosette appearance In severe cases the trees will die. This disorder is common in California in all tree fruits, and also appears in sections of Oregon and Washington, and in nut trees in Southern United States.

Copper deficiency has been observed in citrus trees in Florida, and in apples, peach and plums in South Africa. The leaves become chlorotic, the terminals are rosetted, and the twigs die back. Spraying the leaves with copper, or applying ¼ to 2 pounds of copper sulfate per tree to the soil readily corrects the trouble.

Of the eleven elements whose deficiency symptoms have been described, nitrogen is the one commonly lacking under Maryland conditions. The symptoms of lack of nitrogen are easily recognized. Available potassium is scarce on many of Maryland's orchard soils, yet no cases of severe deficiency and injury have been observed, as has been reported in Massachusetts and Canada. However, with available potassium low and lime content high, injury from lack of available iron may occur on fruit trees on certain soils. It is probably the first deficiency to be suspected if chlorosis occurs.

Physical injuries to trees that produce disorders resembling mineral-deficiency chlorosis are common, and winter injury to the crown, mouse injury, or disease, may be suspected when there is a pale or chlorotic appearance. If no injury is apparent on an unhealthy tree close examination of the nature and degree of chlorosis, the pattern of green and yellow areas, the appearance of dead areas in the leaf, the progress of defoliation, and the pre-

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TWO GREAT CITRUS SHOWS

Floridians and Florida winter visitors during the coming month will have the opportunity of visiting two great citrus expositions — the Florida Orange Festival at Winter Haven which opens on January 17 and closes on January 22, and the Florida State Fair at Tampa, January 25 to February 5.

The Florida Orange Festival which has become an established winter institution will be staged this year in entirely new and permanent exposition buildings which recently were dedicated, and the sponsors of the Festival aim to make of the 1938 exposition the world's greatest citrus show. Judged by past performance and the enthusiasm actuating the officers and directors of the Festival, it is not too much to anticipate that this aim will be realized.

Held in the center of the citrus producing areas of Florida the Orange Festival brings to its booths the finest products of the citrus counties of the state, and while primarily a citrus exposition, other attractions and features of amusement are not neglected.

The Florida State Fair at Tampa, while not an exclusive citrus show does make citrus its chief feature of exhibits and its outstanding attraction for visitors. Recognized as one of the greatest of all state fairs, the Florida State Fair brings together outstanding exhibits of the varied products of land and sea throughout the entire length and breadth of the state.

Every citizen of Florida will be well repaid for a visit to either or both of these expositions, and no visitor to the state can afford to miss the attractions offered, which are in themselves a liberal education in the products, industries and life of the Sunshine State.

THE CITRUS MARKET SITUATION

In its December review of the fruit market situation, the Bureau of Agricultural Economics notes that market prices for oranges thus far this season have followed rather closely the prices of a year earlier. During December, prices of California Navels were slightly lower than those of a year ago, but Florida orange prices were slightly higher than in 1936. The crop of California Valencias which will furnish the bulk of the summer supplies, is indicated to be more than half again as large as the freeze-damaged crop of last year.

While grapefruit prices have declined seasonally since the beginning of the season in September, they have remained above the prices ruling last year. Total shipments to the middle of December were slightly less than a year ago. One rather surprising feature of the report is that which shows that shipments from Texas have been running ahead of shipments from Florida.

On the New York market during December, Florida grapefruit averaged $2.47 per box compared to $1.99 per box a year ago. Texas grapefruit in the same market during November averaged $2.21 per box as against an average of $2.11 a year earlier.

OPPOSE FREIGHT RATE INCREASE

Florida citrus growers and shippers are presenting a united front in opposition to a proposed increase of 15 cents per hundred in rail freight rates, which they contend would greatly injure the citrus industry of the state.

A hearing on the application of the rail carriers is to be held before an interstate commerce commissioner in New Orleans on January 10, and this hearing will be attended by a number of Florida growers and shippers of fruits and vegetables. The Florida Citrus Commission will be represented by Chairman John Maxcy and Secretary R. E. Bateman, who will present arguments against the proposed increase on behalf of the growers of the state.

The Growers and Shippers League of Florida, which organization has been at the forefront in opposing other attempts to increase rates, is leading the fight against the present proposal of the railroads. The increase sought, it is contended, would result in heavy loss to growers.

It is also pointed out that the railroads themselves might be the losers by an increased rate, which would tend to divert rail shipments to trucks and water carriers, depriving the rail carriers of needed tonnage and tending to cause still further congestion in markets reached by trucks and boats, thus forcing down prices and causing loss to producers and shippers.

Every possible effort is being put forth to defeat the application for the increase.

The Florida Citrus Commission is to be commended for the firm stand which it has taken to prevent the shipment of any frost damaged fruit from the state. Florida growers cannot afford to lose their place in the markets by the shipment of damaged fruit.

Compare Results!

In sincere appreciation
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1. Citrus aphid
2. Citrus thrips

Control Of Thrips And Aphids In Citrus Groves

by J. R. Watson
ENTOMOLOGIST
FLORIDA EXPERIMENT STATION

In many sections of the state there seemed to have been recently more of the green citrus aphids in existence than is usual for this time of the year. Doubtless much of the new growth on which these aphids were feeding was killed by the recent low temperatures. But some in sheltered places doubtless escaped. It is expensive to fight an infestation of aphids once they become numerous. The best insecticide we have ever found is a 3 per cent nicotine sulphate lime dust. When put on during a quiet time, i. e., a time when there is no wind, this is very effective in killing aphids, but when aphids are flying about, the trees very promptly become infested so that the dusting has to be repeated, making the fighting of aphids at blooming time an expensive procedure.

Prevention is always cheaper than control and this is the reason for our taking up this subject at this time when aphids are scarce in the groves. It should be our aim to keep them scarce. There are two forms of the green citrus aphid: a winged form and a wingless form. Which form will be developed depends chiefly on the food supply. As long as the foliage is young and tender, nine-tenths of the aphids will be of the wingless form, but when the foliage approaches full size and begins to harden up nine-tenths of them will form wings and fly away. Winged forms will be scarce from now until early spring, so scarce that what few do develop will not be likely to leave the grove in which they are raised. In other words, there will be practically no migration of aphids until well along in the spring, probably the middle of March, until some of the spring growth begins to harden. This means that practically all the aphids a grower will have at blooming time will have been raised in his own grove during the next two or three months. It makes very little difference what your neighbor does, unless your grove is small and surrounded by other groves. The proper preventative is to destroy all aphids found in the groves during the next two months. At this time of the year when aphids are scarce one is apt to consider a few colonies as of no importance. As far as the damage that they are doing is concerned they are of no importance. The danger lies in their rapidity of multiplication. This aphid, under favorable weather and food conditions, will begin to produce when only six days old, and their average rate of production for the first couple of weeks of their lives under favorable conditions is six young per day. With this extremely short life cycle and large numbers of young it is easily seen that a very few aphids at this time of the year may produce immense numbers by the end of two or three months. If you have any doubts on this point, take out your pencil and figure how many off-spring a single aphid could have at the end of three months if it produced six per day with a generation every week — and remember they are all females. We have never seen a male on a citrus tree, nor, in the main citrus belt of Florida, or on anything else. Of course, as a matter of fact we never do have this maximum reproduction. Aphids, as well as other things, have their enemies; syrphid flies and ladybeetles and a fungus disease being among the most important checks on them. But these predators also have their enemies and diseases, so that they can never be depended upon to entirely prevent an outbreak, although they are a great help, especially the Chinese ladybeetle which we have succeeded in establishing in at least three counties of the state. This extremely large beetle eats more aphids per day than a dozen of our native ones and, what is more important, we have not found it to be as highly parasitized by either wasp-like parasites or fungus and bacterial diseases as are our native ladybeetles.

The program then for the next two or three months, in aphid control, is to destroy every single green citrus aphid seen in the grove. Weather conditions may prevent a heavy outbreak of the aphids next spring. During a dry and cold winter when there is very little growth on the citrus trees, aphids will be scarce, but let there come a warm, moist winter, causing more or less young growth on young citrus trees, and aphids will be able to grow and multiply during the winter and their numbers may become very great and the damage may be serious by the time the main flush of growth comes out in the spring. This aphid must have tender growth on which to feed. It cannot live and reproduce on mature foliage, so the abundance of the aphids and the amount of damage they will do in the spring is determined entirely by the weather in the winter, particularly December and January and the early part of February.

Destruction of the aphids during the winter time is an extremely cheap insurance against a possible outbreak, if weather conditions should be favorable for aphids during the winter. Aphids found during the winter are mostly on young trees, and it is the young trees particularly which need attention. At this time of the year perhaps the most handy method of fighting aphids is to go through the groves once every week or ten days with a bucket containing a good, strong insecticide, such as nicotine sulphate or a pyrethrum compound. The colonies at this time of the year will be mostly out on the ends of branches which can be easily bent over into the bucket. Swish them around once or twice so as to thoroughly wet all aphids. A little soap or other spreader should be put into the bucket with the insecticide (nicotine sulphate) so as to facilitate the kill.

One grower that I know of keeps in his pocket a little sack containing a little nitotine sulphate lime dust. Whenever he sees a colony of aphids he bends the sprout into the bag, closes up the opening with his hand, gives it a shake or two, places the bag back in his pocket and goes about his work. Other growers make it a practice to pinch off and destroy all colonies of aphids that they see at this time of year. Later on, when the aphids become more abundant on young growth further down the

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branches where they cannot be bent down into buckets, spot dusting may be resorted to, using 3 per cent nicotine sulphate lime dust. If done on a quiet, warm day this will be found very satisfactory. Whichever method you choose, destroy all colonies of aphids from now until blossoming time in the spring. This is a cheap and effective insurance against a serious outbreak of this potentially very destructive pest.

The common flower thrips damages citrus for a few weeks in the spring, blooming time and shortly afterwards. If thrips are abundant at the time the citrus trees are in bloom they fly to the blossoms in large numbers, sometimes as many as two hundred to a bloom. They feed largely on the petals, stamens, and pistils, and if sufficiently abundant may cause the bloom to drop. A citrus tree commonly puts on more bloom than it can possibly set fruit and in such instances thrips do little more than cause a premature dropping of blossoms that would ordinarily come off later. But when they are excessively abundant or the bloom is unusually scanty their depradations may seriously shorten the crop. In some groves where the bloom was scanty and the thrips abundant, one spraying for thrips has increased the crop 300 per cent.

As soon as the petals and the stamens fall from the fruit, the adult thrips fly away to other blossoms, but they have laid their eggs in the top of the stem, the so called receptacle, just below the fruit. In about three days these eggs hatch and the young thrips, having no wings, are obliged to feed on the young fruit. They feed here for about two weeks during reasonably warm weather, then they develop wings and in turn fly away to other blossoms. Large numbers of these young thrips may cause the fruit to drop, or their feeding punctures may injure the rind so severely that it will be permanently scarred.

Thrips are most abundant during dry, warm weather. They usually reach their maximum numbers during the late spring. The Florida flower thrips occurs in a vast number of blooms; indeed in practically all blossoms, but they are most abundant in those blossoms whose structure gives them a good hiding place. They are less apt to be abundant in blossoms which are wide open, nor do they like those with a tube full of nectar, like a honeysuckle,

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but blossoms like citrus, tomatoes, roses, wisteria, and chrysanthemums, etc., give them ideal hiding places. Although they do breed to some extent on very tender foliage, such as that of cherry laurels and wild cherry trees, beans, peanuts, etc., the vast majority of them breed in blossoms or on the young fruit immediately after blooming time.

Thrips can be killed by spraying. On citrus a spray of Black Leaf 40 or other nicotine sulphate with some good spreader, like lime-sulfur, wettable sulfur, penetrol, or soda, will kill those hit, but in the citrus bloom they congregate chiefly behind the stem where they can be reached only by good strong pressure. Another complication in spraying for thrips is that trees in the citrus grove ordinarily do not bloom simultaneously but string out their bloom over a period of several weeks. This makes it necessary in spraying for thrips to go over the grove several times. This, and the fact that the nicotine is a comparatively expensive spray, makes spraying for thrips a rather expensive and unsatisfactory method of control. Prevention is much cheaper.

Since these insects breed in blossoms chiefly, it is very important that no weeds be left to bloom in or near citrus groves during the next two months or more. One very common and favorable host of the Florida flower thrips is the white needle or Bidens, which is so common in the citrus groves, particularly in the southern part of the citrus belt and in moist soil. They are very common on the banks of ditches in low lying groves and in such situations, though most of the grove may be well disked, are commonly neglected. Cutting the weeds in citrus groves and making a good, thorough clean up of it, on ditch banks and fence corners as well as under the trees, will ordinarily go far in giving the growers protection from this insect. Destroy all weeds which are likely to bloom in the grove from now until after the blooming period of citrus in the spring, and the chances for a heavy infestation of thrips in the bloom will be much reduced.

Incidentlly, this same procedure is the best for roses, chrysanthemums, and other flowers about the house. Keeping weeds down in the neighborhood of the flower gardens will make thrips very much less abundant and troublesome.

The Citrus Outlook.... For 1938

By E. F. DeBusk, Citriculturist, State Agricultiral Extension Service

The per capita production of citrus fruits in the United States in 1931-36 increased 26 percent over that of the 5- year period of 1925-30, while the per capita produciton of four out of the five major competing fruit crops showed a decline of five to thirty percent. Pears alone showed a gain of 11 percent. The average production of all fruits during the next five years will probably be larger than the average for the five year period just passed, but citrus fruits may be expected to continue to lead in the increase and offset the probable decline in apples and grapes.

Oranges

The upward trend in orange production of the last ten years will probably continue for several years, even though no new plantings are made, but at a more moderate rate for the next four or five years. The Florida crop may be expected to increase at a somewhat faster rate than that of California or Texas. Of the 34½ million bearing trees in the United States, 45 percent have not reached full production. The number of orange trees planted doubled between 1920 and 1935. The average production of the last five years has been 54 million boxes; an average of 55 to 60 million boxes seems probable during the next five years. The increase will be mainly in Valcias, with Florida showing also an increase in the early varieties and California remaining at a stand still.

Of the 7¾ million bearing trees of the early varieties in Calfiornia, 74 percent have reached full production, whereas only 55 percent of the 7¼ million bearing trees of the early varieties in Florida have reached full production.

Of the 11⅝ millions of bearing Valencias in California, 55 percent have reached full production, and only 44 percent of the six million bearing trees of the late varieties of Florida have reached full production.

An increase in consumer income may result in an increased demand for oranges sufficient to prevent prices going lower than during the past few years. Exports from the United States are not likely to show much increase during the next five years because of increasing production and competition of other countries.

Palestine produced eleven million boxes of oranges last year, compared with an average of less than three million boxes during the five-year period of 1926-31. The world crop of 193 million boxes last year showed an increase of 20 percent over the average of the five year period of 1926-31.

Grapefruit

The last season crop of grapefruit reached 30¼ million boxes, which is 80 percent above the average production during the previous five years. In the light of recent production trends and potential increases in bearing surface of young trees, it seems certain that the average production of the next five years will exceed 25 million boxes and may approach 30 million. Florida produced 18 million boxes in 1936-37, with only 61 percent of her trees in full production. The number of bearing trees in all of the state in 1935 was three times the number in 1925 and five times the number in 1920. At present only 31 percent of all grapefruit trees in the four states are in full production.

The greatest increase in Florida will be in the early or seedy varieties. Florida has 83 percent of the bearing trees of this class, with 73 percent of that number in full production. The increase in Texas will be largely in the seedless varieties. Texas has 50 percent of all of the bearing trees of the seedless varieties, with only four percent of that number in full production.

Because of rapidly increasing world production of grapefruit and consequently heavy competition in the European markets, exports of fresh grapefruit from the United States in the next few years probably will not exceed the average exports of the last five years. Exports of canned grapefruit have shown a rapid increase in the last six years and prospects appear favorable for continued heavy exports in the next few years. Probably the strongest competition at present is

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Manganese - A Trace Element

BY DR. R. V. ALLISON
CHEMIST, FLORIDA EXPERIMENT STATION

The fact that manganese is taken up by green plants was established as early as 1788 by Scheele. That green plants actually require this element for normal metabolism and growth was not definitely proven, however, until about the turn of the present century or more than a hundred years later.

Insofar as the actual function of manganese in the plant is concerned we have been even slower in the development of definite information. Experimental evidence is accumulating, however, and pointing rather specifically to a close association of manganese with iron in the maintenance of the chlorophyll supply. Thus Doctor John W. Shive, head of the Department of Plant Physiology at the New Jersey Agricultural Experiment Station, is finding that while a deficiency of iron always results in chlorosis whether the manganese supply is adequate or not, typical iron chlorosis also results if manganese is deficient even though there is an adequate and well distributed supply of iron in the plant. This is to say iron deficiency produces chlorosis for lack of iron as such even in the presence of an abundance of manganese but the the same kind of chlorosis appears in the absence of manganese even with an abundance of iron presumably because iron cannot function normally in the synthesis of chlorophyll in the absence of manganese.

The first studies of importance with manganese under Florida conditions were made in the Everglades and on the high lime (marl) soils of the Lower East Coast. Subsequently rather detailed, cooperative work with citrus was organized by Skinner and Bahrt on both alkaline and acid soils which have given results of considerable interest with this element.

It has been known for some time that manganese deficiency or inavailability in the soil is most commonly due to an excess of lime or what we commonly refer to as a too high pH. The action of the lime is to convert the manganese present or applied to an insoluble form and to render it comparatively inaccessible to the action of the plant. There is good cause to believe that some of our moderately acid soils of the lighter types may be actually deficient in the element, however, either through the removal in plant harvests or by leaching, especially under improper conditions of fertilization and handling of the land. Thus in the Everglades we have highly valcareous peat and muck soils that in their natural condition are about as alkaline as most plants will endure without trouble with manganese. This is due to the fact that they lay on a limerock or marl base for the most part and consequently are practically saturated with lime. When these soils, therefore, burn as they frequently do, unfortunately, there is a direct concentration of lime in the topsoil and plant development is usually according to the severity and recency of the burn, at least within certain limits. If several inches of the top soil are reduced to ashes practically nothing will grow for some time without a liberal treatment with manganese sulfate or sulfur which, of course, adds considerably to the cost of the operation. If further burning is prevented the ash gradually breaks down and leaches out with drainage waters so that in a few years burned soils become practically normal again with the exception of the loss of surface elevation which, of course, is very important from the drainage standpoint in flat soils of this nature. The use of elemental sulfur as a soil treatment will greatly expedite the removal of this excess alkalinity through the action of the sulfuric acid that is produced as certain soil micro-organisms rapidly convert the yellow material to this highly active form. Extension areas of peat and muck soils in Florida other than the Everglades present this same problem if and when they are allowed to burn.

On the lower east coast the highly calcareous soil referred to is almost a pure marl extending over many thousands of acres in that section. Here, as might be expected, very pronounced deficiency symptoms develop in a number of plants for lack of manganese when grown on untreated areas. Potatoes and beans are very much affected by the conditions while tomatoes do not appear to give any particular response to manganese treatment. So far as residual effect on these soils is concerned, careful studies by the Subtropical Experiment Station indicate that the decline in yield of potatoes the second year without re-treatment is more than sufficient to justify the cost of the manganese necessary. That there is a carry over effect, however, is indicated by the fact that four years after treatment the yield had dropped only to 75 per cent of that with manganese and no symptoms of manganese deficiency had shown in the foliage. The Redlands soils, although they largely consist of limerock seem to behave quite differently. Many soil conditions in Florida range somewhere betwcen these two extremes insofar as their lime-manganese relationships are concerned. A rather common condition is a marl or high lime subsoil, at variable depths, which will affect deep rooting plants or which in plowing is brought to the surface, mixed with the surface soil and so an undesirable cultural condition developed from the purely reaction standpoint.

The only other general soil condition that I should like to refer to is the comparatively light, acid soils so common in Florida. Without doubt the continued use of synthetic fertilizers in the form of progressively purer salts, as seems to be the trend, will have a very definite effect upon the balance of such trace elements, as manganese, zinc, etc., in these soils. The substantial interest in bringing mixed fertilizers to a reaction base that is in substantial harmony with the purposes for which they are to be used that has de-

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Citrus Production Trend Sharply Upward . . . . .

(Concluded from last issue)

Exports From The United States Declining

There has been an increase in foreign demand for grapefruit during recent years but most of this has been absorbed by increases in foreign production. The rapid increase in the production in Palestine has greatly restricted the exports of fresh grapefruit from the United States to Europe during the period, December to April, when Palestine grapefruit is being marketed. Increased competition also has developed during the summer months as a result of the increasing competition from southern hemisphere countries, particularly Brazil and South Africa. Total exports of fresh grapefruit from the United States in the 1936-37 season September to August, were 704,000 boxes compared with 928,000 boxes in 1935-36. The decline was due to the heavy competition from Palestine during the winter and spring and to the short crop of California grapefruit for export during the summer season. Because of the heavy competition in the European market, exports of grapefruit from the United States in the next few years probably will not exceed

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the average exports of 995,000 boxes in the 5 year period 1931-32 to 1935-36, except in years of small competing crops. Exports during the 1937-38 season should be considerably larger than the small movement int 1936-37.

Outlook for Canned Grapefruit; Exports Favorable

The canning factory has become an important marketing outlet for grapefruit in Florida and Texas in recent years. Since 1928 there has been a rapid increase in the canning of grapefruit juice and sections, and during the 1936-37 season about 34 per cent of the total production of Florida and Texas was used for this purpose. The total pack of grapefruit sections in Florida, Texas, California, Arizona and Puerto Rico increased from about 1,051,000 cases (equivalent cases of 24 No. 2 cans) in 1928-29 to the record of 4,301,000 cases in 1936-37; the total pack of grapefruit juice increased from 205,000 to the record of 6,461,000 cases during the same period.

Exports of canned grapefruit have shown a rapid increase in the last 6 years and prospects appear favorable for continued heavy exports in the next few years. Exports of canned grapefruit segments and juice in the 10-month period, November to August, of the 1936-37 season totaled 1,083,000 cases compared with 823,000 cases in the same months of the 1935-36 season. Total exports for the 1936-37 season will be about equal or larger than the record exports of 1,159,000 cases in 1934-35.

Exports of canned grapefruit segments and juice from November to October 1937-37 will depend chiefly on the size of the 1937-38 pack since there appears to be a good export demand. Little competition has developed so far from foreign suppliers of canned grapefruit but steps are being taken in Palestine to utilize citrus fruits in byproducts plants. Probably the strongest competition at present is from Japanese canned mandarin-orange segments

Prices to Growers Low

The large grapefruit crops of the last 3 seasons have returned prices to growers about equal to the low prices received for smaller crops in the depression years of 1931 and 1932. Moreover, as production has expanded, increasing quantities of grapefruit have been utilized by canning plants. Of the 30,281,000-box crop in 1936-37, over one-fourth was

(Continued on page 19)

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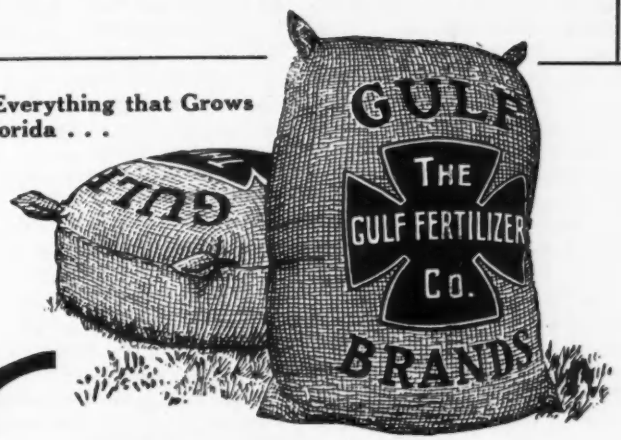

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MANGANESE — A TRACE ELEMENT

(Continued from page 15)

veloped during the past few seasons however, should relieve the situation on such soils immeasurably and very appreciably protect the trace elements already in them against excessive leaching.

Two general methods of treatment with manganese offer themselves. Usually the sulfate form is used, either as the high or low grade and placed directly in the planting furrow in the case of row crops. This is to avoid as much exposure of the element as possible to the tendency of such soils to reduce it to an insoluble form. It is now quite commonly placed directly in the fertilizer mixture where such treatment is contemplated at the same time. If the soil is extremely alkaline, and soil treatment is contemplated, naturally the amount or rate of treatment will be judged by the conditions that prevail. Under grove conditions five or six pounds are commonly used on trees in normal bearing. Carry-over or residual effects will depend entirely upon the individual soil conditions and plant involved.

The second method of treatment that is coming into rather common use is by spraying onto the foliage of the plant for direct assimilation through the leaves. This is being used rather extensively in the trucking areas of the Everglades and the lower east coast and descriptive literature on the procedure can be had from the Experiment Station for the asking. The fact that the manganese is protected in this way from exposure to reversion actions in the soil makes the amount of material for this method much less but the cost of application is of course much more. And then unexpected rains make it necessary to respray, etc. Whether a method of spraying can be worked out for tree crops, either on alkaline or acid soils, that will be satisfactory from every standpoint remains to be seen. The effectiveness of leaf treatment with manganese was first demonstrated by McLane in Rhode Island in 1927.

The first observable symptoms in most plants with the occurrence of a deficiency of manganese is an irregular loss of color in the leaves usually referred to as "mottling," "frenching," etc. It should not be confused with zinc "frenching" for the two frequently occur together and thus tend to mask each other to a considerable extent. However, if both conditions are present, whichever element might be supplied to the plant first, the symptom of the other will remain after the action of the first has been completed. This has been especially observed in citrus.

Practically all types of plants, agricultural and ornamental, large or small, are severely affected by manganese deficiencies under certain conditions though the various types and species of plants differ greatly in this respect. I have seen thousands of acres of beans in the Okeechobee region yellow and die without forming a marketable bean, for the lack of it. Likewise, sugar cane, corn, peanuts, royal palms, etc., etc., have failed completely for the same reason. Orange and tangerine trees west of Davie (Ft. Lauderdale) on the edge of the Everglades were found to be in bad shape on a shallow muck over marl where the latter came nearly to the surface and indeed had been worked into the tops of the beds or ridges. Treatment of the soil with manganese sulfur or sulfuric acid gave good relief in every case. One of the worst cases of manganese deficiency in citrus was observed on tangelo trees at Port Mayaca where apparently the shallow topsoil of much had been burned badly. It seems to be especially susceptible for the foliage was nearly devoid of green and almost a solid yellow. Treatment with acid forming fertilizers and sulfur as well as manganese sulfate cleared it up rapidly.

According to the work of Skinner and Bahrt during the past few years favorable results have been obtained with the use of manganese on citrus both on acid and alkaline soils insofar as a deficiency higher manganese content of the fruit is concerned as well as increased weight, firmness and color intensity of the rind. Futhermore, they observed the treatment to produce juice in the tangerine of quite a different color (Cadmium orange) from that of untreated fruit (Cadmium yellow). They also found a more consistent response where double strength fertilizers were being used, whether acid or basic, in comparison with single strength goods. Thus, according to a 1934 report in the proceedings of the Horticultural Society, on a hammock soil underlain with calcareous rock, manganese sulfate with an acid producing fertilizer increased the yield only 9 to 15 per cent while with a base producing fertilizer it increased it to 71 to 83 per cent.

While the role of manganese in animal nutrition has received a certain amount of attention, findings to date do not seem to attach great importance to it, at least in comparison with copper or iron. Current work in New York, however, is showing that it does seem to be a specific in the control of perosis or "slipped tendon" in poultry whether supplied as a pure salt of the metal or as a trace element in low grade carriers of phosphorus in the ration such as a technical rather than C. P. grade of mono-calcium phosphate. The absence of well established functions of manganese in animal or human nutrition can not minimize the importance in any way, however, in the place this element has established for itself in plant metabolism and growth.

PETE STAATS IN NEW JERSEY

The many friends of Pete Staats, for a number of years assistant to W. H. Klee, manager of the Nitrate Agencies Company in Florida, will be pleased to learn that he is progressing as nicely as could be expected at Glen Gardner Sanatorium, Glen Gardner, N. J.

Mr. Staats is widely known among citrus folks over the state who will hope for his speedy return to Florida.

Anyone wishing to communicate with Mr. Staats may reach him at the address noted above.

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IMPRESSIONS

(Continued from page 7)

the time.

C. T. Allen, Jr., Boston representative of the Florida Citrus Exchange ever since Hector was a very small dog, out with Louis A. Hakes, district manager of the Exchange at Orlando, looking over the Florida situation. Talk drifted, as it somehow will when old-timers get together, to the late Frank L. Skelly and some of his outstanding performances during the days when he used to preside over Exchange selling, and Mr. Allen told us how he helped in drafting Frank Skelly's original application for a job with the Exchange at the time when the latter was in the wholesale produce business in Harrisburg, Pennsylvania. Well, whoever aided and abetted Frank Skelly in getting actively into the Florida citrus deal certainly did Florida a kindness which can never be repaid. No other one man, many are willing to say, contributed so much to stability and prosperity of the industry during those years he functioned actively here. Some there are who say outright that much of the demoralization and politicking in Florida citrus these last few years could not have been had Frank Skelly lived to continue to spread the mantle of his friendlines over it.

Good news that Charles A. Price is sufficiently recovered in health to be back in the sales department of the Exchange at Tampa. Charlie Price today has forgotten more about the sale and distribution of Florida citrus fruits than some ever will learn. It is fine, too, that the Exchange organization throughout so greatly appreciates him and his counsel. Charlie Price came into the Florida citrus picture through the instrumentality of Frank Skelly, coming out of the same wholesale house in Harrisburg; and continues one of the industry's substantial assets.

News through Mr. Allen of George A. Scott, former salesmanager of the Exchange, now living with his son in Watertown, Mass., and in a considerably improved state of health. That will be good news to the multitude of friends George Scott made during the period of his service in Florida; and this writer is proud to be one of them.

Some are born famous, and some just go right out and achieve fame. Sometimes when they least expect it. Consider the case of Ward C. Klingensmith, the w. k. Titusville grower. Ward Klingensmith is chairman of the board of county commissioners of Brevard county, city commissioner of Titusville, and the Lord only knows what else. But fame didn't arrive by that route. Ward Klingensmith is famous in Brevard county as the man who can climb trees with boots on, just as well, perhaps even better, than if he were in his sock feet. In a rural county that is fame for sure. Ask up at Mims, down at City Point or Melbourne, who is chairman of the county commissioners, and mighty few will know. Ask who in Brevard can climb trees with boots on and the answer will come right back: "Mister Ward Klingensmith of Titusville!"

The how and the which of that is thusly: A bear killed a calf out in the prairie herd in which Ward Klingensmith is interested. He got his dogs and a couple of hired hands and followed close on a hot trail. They picked up the bear, and the bear dived into a big bayhead. He sent the hired hands around the bayhead, giving one, who was unarmed, his gun, while he put the dogs through the bayhead to drive the bear out. However, instead of plunging through the bayhead the bear bounced back; and there was Ward Klingensmith out on the lone prairee with no gun, a couple of demoralized dogs, one tree, a bear who wouldn't play according to the rules, and his boots on. It was a lady bear, who had only stopped by the bayhead to pick up her cub. The bear charged, swearing horribly, followed by the cub, likewise cursing and throwing sticks. Ward Klingensmith grabbed up a dog under each arm, and, boots and all, went skinnning up the tree. The bear followed but the Titusvillian gained altitude at the rate of six feet to the bear's two, according to the hired hand who hurried to the spot and killed the bear with one shot. Just about in time too, for, according to reports, the bear had forced Ward Klingensmith clear to the top of the tree until he was standing balanced on one foot on the topmost branch, but still holding both dogs, and still with his boots on. Thus came fame.

E. C. (Ed) McLean of Palmetto has passed from among us, and somehow the news didn't come to us for several weeks. One of the important and most constructive figures of Manatee county, Ed McLean had been in bad health for some time, and largely had passed the active operations of E. C. McLean Inc., over to his two nephews, who continue the business. Few men commanded the confidence of other growers to the extent that Ed McLean did, and not only Manatee county but the whole of the lower West Coast will miss him greatly.

The other night while the radio was going a three-year-old said: "I'd rather hear Boake Carter sing, why don't he sing?" Which somehow brings up the question as to just why we should be punching out these lines, rather than following our natural bent and playing the oboe?

CITRUS PRODUCTION TREND SHARPLY UPWARD

(Continued from page 17)

used in the canning of juice and segments for commercial outlets and, in addition, 3,000,000 boxes, or 10 per cent, was purchased by the Federal government for relief distribution. Although the canning of grapefruit tends to decrease the pressure of increasing supplies upon the fresh fruit market, this is to some extent offset by competition of the canned product with fresh grapefruit.

Production in foreign countries is also increasing with the result that exports can be expected to meet with greater competition. It appears, therefore, that the marketing problem for grapefruit involves the further development of the domestic market, and will grow more acute as production increases. Such a program of development should give particular attention to reducing the cost of handling and marketing.

During recent years, marketing-control programs have been employed from time to time to improve returns to growers. It is not unlikely that further efforts in this direction would assist growers to counteract the depressing influence on price of the larger crops in prospect.

IF suffering with Piles, I want to help you. Drop me a line explaining.

Fred C. Whitney
317 6th Ave., Des Moines, Iowa

1. Chinese ladybeetle see Leis Ladybeetle
2. Leis Ladybeetle

The Giant Leis . . . Ladybeetle

BY LEWIS S. MAXWELL

The history of the large yellow lady beetle that has been so beneficial in the control of aphids in the citrus groves in Central Orange county, began when it was found in South China in 1924 by Dr. Silvestri who was collecting for the California Experiment Station.

J. R. Watson, Florida Entomologist, obtained some of these and bred many thousands of them. They were sent out all over the State but the only permanent colony resulting from this was the one out at Dr. Phillips' grove. Here they have multiplied satisfactorily and have given good commercial control of citrus aphids in that vicinity.

The main reasons why these beetles are so much more effective is because they are so much larger than other similar types and will eat as many as 200 aphids a day and because the parasites, both insect and fungus, that kill the native lady beetle do not affect the Leis. Then too, the Chinese ladybeetles (Leis) propagate much more rapidly.

Conditions that are favorable for the continued development of the predatory beetles are varieties of citrus, especially such as tangerine, which have a long season when aphids attack them. These beetles also feed upon the blossoms of the saw palmetto and the extro floral nectaries of Crotalaria striata. These beetles feed upon these and some few other plants, but the papaya white fly is the only thing besides aphids that they seem to be able to breed upon. The pumpkin bug menace can be avoided if the Crotalaria striata is cut before it produces pods in abundance. And these beetles also like a woods patch near the grove in which to hibernate and the woods should not be burnt. Ants will drive the beetles away from the aphids; so when a colony of beetles is liberated in the grove, ant hills under the trees should be treated with something to kill the ants.

These beetles will give reasonable commercial control of aphids and W. W. Yothers states that there are certain circumstances that indicate that these Leis will feed upon purple scale.

This beetle although hard to establish, will certainly pay large dividends to the grove owner who accomplishes the act and again we pay homage to Prof. J. R. Watson for a piece of valuable work.

Local Woman: "My husband is the only man who ever kissed me."

Neighbor: "Are you bragging or complaining."

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Soil conditions are the absolute determinant of the basic health and productivity of your groves and fields. Above all, you should have full and reliable knowledge of the foundation of all your wealth and profits.

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Agricultural Outlook Work

Larger Production of Citrus Fruit Is Seen By Economists

Continuance of the upward trend in production of Florida citrus in 1938 is predicted by the State Agricultural Extension Service, Gainesville, in its annual outlook report for the new year. This prediction, however, is based on favorable weather and growing conditions.

The Extension Service concurs with the Bureau of Agricultural Economics in the belief that the average production of all fruits during the next five years will be larger than that of the past five years, but this increase will be more moderate than that of the past five years. Much of this increase will be in citrus production.

While production is expected to increase, demand based on consumer buying power, is likewise expected to be stronger in 1938 and the following four years. The buying power of the public is expected to increase but the Extension Service does not expect this increase to be in proportion to the crop increase. Another factor which will, to some extent, offset the crop increase will be improved purchasing power of the principal foreign countries to which the United States exports fruit, the Extension Service believes.

The Florida orange crop may be expected to increase at a faster rate than that of California or Texas. Average production of oranges in the United States during the past five years has been 54,000,000 boxes, but an average of from 55,000,000 to 60,000,000 boxes seems probable for the next five years. The increase will be mainly in Valencias, with Florida also showing an increase in early varieties and California remaining at a standstill.

With only 31 per cent of all trees in the four main producing states in production at this time, the production of grapefruit is expected to rise steadily during the next five years. Florida produced 18,000,000 boxes in 1936-37 with only 61 per cent of its trees in production. The greatest increase in Florida will be in the early or seedy varieties. Because of rapidly increasing world production of grapefruit, exports of fresh grapefruit from the United States in the next five years probably will not exceed those of the past five year period. Exports of canned grapefruit, however, have been increasing during recent years and there are indications that they will continue to rise.

Canning of Florida grapefruit has become an important factor to the industry and prospects for increases in preparation and demand for canned grapefruit are good.

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THE CITRUS OUTLOOK FOR 1938

(Continued from Page 14)

from Japanese canned mandarin-orange segments.

The canning factory has become an important marketing outlet for grapefruit in Florida and Texas in recent years. During the 1936-37 season about 34 percent of the total production of Florida and Texas was used for this purpose. The total pack of grapefruit sections in the United States increased from about 1,051,000 cases in 1928-29 to 4,301,000 cases in 1936-37. The increase has been and will continue to be largely in Florida. The total pack of grapefruit juice increased from 205,000 to 6,461,000 cases during the same period.

While the canning of grapefruit tends to decrease the pressure of inincreasing supplies upon the fresh-fruit market, this advantage is offset in a measure by competition of the canned product with fresh fruits.

It appears that the marketing problem for both oranges and grapefruit involves the further development of the domestic markets, and will grow more acute as production increases. Further reduction in the cost of production, packing and transportation and stricter economies in marketing generally, should be resorted to as a means of offsetting the depressing influence of increasing production on net returns to producers of both oranges and grapefruit. Marketing control program may also be employed to improve returns to growers.

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FROSTPROOF CABBAGE, Collard, Onion plants. 1,000 lots $1.00; 5,000 lots $3.75. Lettuce and Beet plants $1.00 per thousand. Coleman Plant Farms, Tifton, Ga.

ALYCE CLOVER SEED. Ripe and cleaned. Ideal cover and hay crop, Write for information. J. C. Smith & Son, 301 West Main St., Lakeland, Fla.

Very desirable buds on sour orange root. Valencias, Hamlins and Jaffas. Also sour orange seedlings. Prices on request. Nursery at Blanton, Fla. Copothorn Groves, Inc., P. O. Box 310, Tampa

Better Growers Use Our Planned Production Program. Designed for your grove. Soil analysis and interpretations. Sound, Safe, Profitable. J. G. LAWTON, Research Chemist, Bartow, Fla., Phone 8804.

"MAIL ORDER Operator desires contact with grower of high grade avocado pears. Have interesting proposition for grower of highest quality fruit." F. R. Gardner, P. O. Box 528, Greenville, Pa.

ROSE BUSHES — Guaranteed 2-Yr. old fieldgrown everblooming varieties. Fall planting best. Free catalog. Tytex Rose Nurseries, Tyler, Texas.

CARETAKER WANTED capable of looking after small grove in exchange for free house and electric light. Owner will finance small herd of cows so caretaker can earn living on twenty-three acres. Caretaker's dutes simple requiring equivalent to one day's labor a week. Address Lester Perrine, Rumford Avenue, Waltham, Mass.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

THRIFTY TREES and budwood from record performance Perrine Lemon parents. Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

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